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(19c.)

From the International Waterways Commission on conditions as to Niagara Falls, and their recommendations in relation thereto. Also Report of the Commission upon conditions existing at Sault Ste. Marie, with rules for the control of the same recommended by the Commission.

BUFFALO, N.Y., May 3, 1906.

The Honourable the Minister of Public Works of Canada, and
The Honourable the Secretary of War of the United States.

The International Waterways Commission has the honour to submit the following report upon the preservation of Niagara Falls:—

The Commission has made a thorough investigation of the conditions existing at Niagara Falls, and the two Sections have presented reports to their respective Governments setting forth these conditions to which attention is invited. The following views and recommendations are based upon a careful study of the facts and conditions set forth in these reports.

1. In the opinion of the Commission, it would be a sacrilege to destroy the scenic effect of Niagara Falls.

2. While the Commission are not fully agreed as to the effect of diversions of water from Niagara Falls, all are of the opinion that more than 36,000 cubic feet per second on the Canadian side of the Niagara River or on the Niagara Peninsula, and 18,500 cubic feet per second on the American side of the Niagara River, including diversions for power purposes on the Erie canal, cannot be diverted without injury to Niagara Falls as a whole.

3. The Commission therefore recommend that such diversion, exclusive of water required for domestic use or the service of locks in navigation canals, be limited on the Canadian side to 36,000 cubic feet per second, and on the United States side to 18,500 cubic feet per second, and in addition thereto a diversion for sanitary purposes not to exceed 10,000 cubic feet per second be authorized for the Chicago Drainage Canal, and that a treaty or legislation be had limiting these diversions to the quantities mentioned.

The effect of the diversion of water by the Chicago Drainage Canal upon the general navigation interests of the Great Lakes System will be considered in a separate report.

The Canadian Section, while assenting to the above conclusions, did so upon the understanding that in connection therewith should be expressed their view that any treaty or arrangement as to the preservation of Niagara Falls should be limited to the term of twenty-five years, and should also establish the principles applicable to all diversions or uses of waters adjacent to the international boundary and of all streams which flow across the boundary.

The following principles are suggested:—

1. In all navigable waters the use for navigation purposes is of primary and paramount right. The Great Lakes System on the boundary between the United States and Canada and finding its outlet by the St. Lawrence to the sea should be maintained in its integrity.

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2. Permanent or complete diversions of navigable waters or their tributary streams, should only be permitted for domestic purposes and for the use of locks in navigation canals.

3. Diversions can be permitted of a temporary character where the water is taken and returned again, when such diversions do not interfere in any way with the interests of navigation. In such cases each country is to have a right to diversion in equal quantities.

4. No obstruction or diversion shall be permitted in or upon any navigable water crossing the boundary or in or from streams tributary thereto, which would injuriously affect navigation in either country.

5. Each country shall have the right of diversion for irrigation or extraordinary purposes in equal quantities of the waters of non-navigable streams crossing the international boundary.

6. A permanent joint Commission can deal much more satisfactorily with the settlement of all disputes arising as to the application of these principles, and should be appointed.

The American members are of opinion that the enunciation of principles to govern the making of a general treaty is not within the scope of their functions; moreover the jurisdiction of the American members is restricted to the Great Lakes System.

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Chairman, Canadian Section.

O. H. ERNST,
Colonel, Corps of Engineers, U.S.A.,
Chairman, American Section.

W. F. KING,
Commissioner.

GEORGE CLINTON,
Commissioner.

LOUIS COSTE,
Commissioner.

GEORGE Y. WISNER,
Commissioner.

THOMAS COTE,
Secretary, Canadian Section.

L. C. SABIN,
Secretary, American Section.

REPORT UPON THE CONDITIONS EXISTING AT SAULT STE. MARIE, WITH RULES FOR THE CONTROL OF THE SAME, RECOMMENDED BY THE INTERNATIONAL WATERWAYS COMMISSION.

BUFFALO, N.Y., May 3, 1906.

The Honourable the Minister of Public Works of Canada, and
The Honourable the Secretary of War of the United States.

The International Waterways Commission has the honour to submit the following report upon the conditions existing at Sault Ste. Marie, with rules for the control of the same.

Upon the organization of the International Waterways Commission it found the most pressing matter coming within its jurisdiction was the regulation of the use by private corporations of the waters of St. Marys River in connection with the control of those waters for the protection of navigation at present and in the future. The Commission, therefore, proceeded to an investigation of the local conditions by special committee, and the study of all data obtainable. After thorough consideration of all the information which could be obtained, and after hearing all parties interested in the use of the waters at Sault Ste. Marie, including navigation interests, the Commission is satisfied that the rules recommended herein, governing the use, or interference with the natural flow, of these waters, will do entire justice to private interests, and, at the same time, fully protect commerce and navigation.

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The extent of the commerce on the Great Lakes is well illustrated by the official statistics of the amount of freight which passed the locks at Sault Ste. Marie during the season of navigation of 1905, which amounted to more than forty-four million net tons. To this should be added the local tonnage, which is considerable, and the large traffic between ports on Lakes Michigan and Huron and the east, making a total lake traffic of between fifty and sixty million tons. The immense importance of transportation by the Great Lakes, and the consequent necessity of protecting and facilitating it in the interest of the public, becomes apparent when we consider that the ability to transport by lake must have resulted, during the season of 1905, in saving many millions of dollars. The average rate for transportation of Lake Superior freights in 1905 was \$·00085 per ton-mile, while from the best information obtainable the transportation rate by rail between Lake Superior points and the east is not less than \$·004 per ton-mile. The ton-mile saving over railroad transportation was, therefore, at least \$·00315. The average haul of the freight mentioned was eight hundred thirty-three and three-tenths miles. The total number of tons of freight that passed the Sault locks in 1905 was 44,270,680, and it follows that in this year there was an aggregate saving through lake transportation on Lake Superior through freight alone, of approximately \$116,000,000. In other words, by transporting the Lake Superior freight on the Great Lakes, \$116,000,000 were saved, in 1905, to the producers of raw materials, the manufacturer and the consumer, and the saving to manufacturers has made it possible for them to supply the home markets and compete in those of foreign countries.

The growth of commerce upon the Great Lakes in the past few years, and its prospective immense increase in the future, has convinced the Commission that steps should be taken, not merely to preserve the lake levels, but to retain absolute control of all waters which go to maintain those levels and of all lands which may be useful or necessary, at present or in the future, to increase navigation facilities. The Commission is, therefore, decidedly of the opinion that the Governments of the United States and Canada should act in unison in controlling, absolutely, any and all diversions at Sault Ste. Marie, so that the waters of the river may be available at any time when needed for navigation.

ST. MARYS RIVER.

Our investigation of conditions at Sault Ste. Marie developed the following facts:—

The St. Marys River forms the connecting channel between Lake Superior and Lake Huron. In its length of sixty-four miles, the total fall has varied, in recent years, from 21 to 23 feet; of this total fall, from 18 to 20 feet is found in a distance of three-fourths of a mile at the rapids at Sault Ste. Marie. The entire run-off of the Lake Superior drainage basin, having an area of 76,100 square miles, passes the St. Marys River, giving an average discharge of about 70,000 cubic feet of water per second. As this river forms the only means of water communication between the important industries of the Lake Superior regions and the eastern markets, the advisability of its improvement for navigation purposes was early recognized. In 1855 the first canal and lock capable of passing lake vessels was completed at a cost of about one million dollars. There were two tandem locks, each seventy feet wide, three hundred and fifty feet long, having a lift of about nine feet each, with a depth of eleven and one-half feet of water on the mitre-sills. The great increase in the number and size of boats passing through the St. Marys River necessitated the construction, in 1870, of the Weitzel lock. This lock, completed in 1881 and still in service, is five hundred and fifteen feet long, eighty feet wide in the chamber, and has about fourteen feet of water over the mitre-sills at ordinary low water level.

The increase of lockage facilities did not accommodate the rapid increase in the size and number of vessels necessitated by the constant and great increase of the commerce which passed through the river, and as a result it became necessary to construct

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another lock on the American side. Accordingly what is known as the Poe Lock was built. It has a chamber eight hundred feet long, one hundred feet wide, and a depth of about nineteen feet at ordinary low water.

It was supposed the Poe Lock would accommodate the commerce of Lake Superior for many years. But it, together with the Weitzel lock and the Canadian lock, hereinafter described, has at times proved inadequate for proper despatch of the lake vessels passing the rapids, and it is quite evident that in the near future further lockage facilities must be furnished to meet the demands of commerce.

On the Canadian side of the river a lock nine hundred feet long, sixty feet wide and having about nineteen feet of water on the mitre-sills at ordinary low water, has been constructed. It was completed before the Poe lock. There are several vessels now navigating the lakes which this lock cannot accommodate, their beam being 60 feet or more.

The improvement of the St. Marys River below the locks has been almost continuous, and consists of the clearing of channels, and the construction of the so-called 'Hay Lake Channel.' An available depth of from 17½ to 19 feet, depending on the stage of water, has been obtained. At present the United States Government is engaged in deepening the channels to a depth of 21 feet at low water and in constructing a new channel through the West Neebish, which will furnish an additional passage connecting Hay Lake with Mud Lake. This channel will have a least width of 300 feet and low water depth of 21 feet, or sufficient to accommodate all vessels now navigating the river. These improvements have cost the Government of the United States about fourteen millions of dollars, and the Government of Canada about five millions.

The increase in the size of vessels navigating the lakes, has been rapid. In 1890 lake vessels reached a length of 300 feet, in 1896, 400 feet, in 1902, 500 feet, and 6 vessels 600 feet in length will be put in service during 1906. In 1904 there were only forty boats in the Lake Superior trade with a capacity of 8,000 tons or more, while thirty-two additional vessels will be in commission during 1906, none of which will have a cargo capacity of less than 8,000 tons. The combined cargo capacity of these thirty-two new boats will be about 338,000 tons for a single trip, and they will constitute an addition of about twenty per cent to the carrying capacity of the fleet engaged in the transportation of ore from Lake Superior.

The quantity of freight passing to and from Lake Superior has doubled twice in the past thirteen years, it being 44,270,680 tons in 1905, about four times what it was in 1892. The value of the cargoes passing the Sault canals in 1905 was \$416,965,484, iron, including ore and manufactured iron, constituting twenty-seven per cent of this value and cereals twenty-eight per cent.

It is estimated that the present lockage system is capable of giving what may be considered reasonably prompt service if not required to pass more than fifty million tons during the season of navigation, but if called upon to pass more than sixty million tons, delays, which are not infrequent now, will become excessive and cause great financial loss. In view of the past growth of this commerce it is extremely hazardous to predict its extent in the future, but a conservative estimate indicates that before another lock can be completed the limit of traffic for prompt service will have been passed. In this connection we would call attention to the fact that the largest classes of boats existing, and now being rapidly built, are already restricted in carrying capacity on account of deficient available depth of water, and are subject to delays because not more than one of them can be passed through the largest lock at one time. In addition to this, many of the largest boats now navigating the lakes are limited to the use of the Poe and the Canadian locks, on account of their size. The rate of increase in traffic and in the size of boats, in the future, judging from the experience of the past and the predictions of those conversant with the subject, will make the present lockage system inadequate before lockage facilities can be increased. The loss, financially, which would result from not furnishing means of passage around the rapids adequate to the demands of commerce, or, in case of accident to any of the existing locks, from delay until repairs could be made, would be incalculable.

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The canal leading to the American locks from the upper river is 4,200 feet in length and has an average cross section of about 5,000 square feet. Its width at the narrowest part is only 108 feet, it being crossed at that place by the swing span of the International Bridge. The sides of this canal are frequently lined with vessels awaiting down passage when vessels are leaving the locks to pass into Lake Superior. The manœuvering of boats going in opposite directions in such a narrow passage is very difficult and is accompanied by possibility of accident. The conditions are seriously aggravated by a strong current which occurs in the canal whenever the locks are filled. Plans have been made by the United States Government for enlarging this canal, doubling its width at the narrowest place, and increasing the width at other points. This would relieve the situation at present, but it is quite apparent that provision should be made for further widening, so that when a new lock shall have been constructed, two or more locks may be filled at the same time without creating a violent current. This will necessitate the acquisition of more land on the river side than is now owned by the United States.

The Canadian canal is about 6,000 feet long, from 143 to 156 feet wide, and something over twenty-two feet deep. The Canadian lock above mentioned is at the eastern extremity of this canal. The same general considerations apply to this canal and lock that we have presented in connection with the American canal and locks.

WATER POWER DEVELOPMENTS.

The development of the power of the St. Marys Rapids has been projected and carried on by practically two interests; the Chandler-Dunbar and allied interests, and the Lake Superior Corporation with its subordinate companies, the Lake Superior Power Company and the Michigan-Lake Superior Power Company.

In 1883, Wm. Chandler was granted letters patent for a strip of land about 3,000 feet in length lying along the north side of the St. Marys Falls Canal adjoining the rapids on the American side of the river. In 1887, the Edison Sault Light and Power Company was organized for the purpose of developing water power at this point, and the following year a canal, about 2,200 feet long, was dug through this property, the power developed being used locally, largely for electric lighting. In 1889 a permit was granted the above company by the Government of the United States to extend its tail-race by connecting the lower end of the embankment with Island No. 3, and in 1893 a permit was given for joining Islands No. 3 and 4, which lay in front of the lands owned by the United States, thus providing for a tail-race to enable the company to utilize a somewhat greater head than the fall naturally existing in front of the lands located by Mr. Chandler.

In 1892, a permit was granted by the Secretary of War to the Edison Sault Electric Company, the lessee of the Chandler-Dunbar Company, to build an embankment dam from the third pier of the International Bridge, extending down stream. The completion of this dam or dyke provided a more commodious head-race and the water power developed has been increased since that time as local needs demanded.

In 1901, this permit was modified to provide for the building of a new power house in front of the lands located by Mr. Chandler, and the construction of a new tail-race outside of Island No. 3, belonging to the United States, on condition that the company should 'abandon the tail-race now used on the inside of Island No. 3, and relinquish to the United States all rights of the Company between said Island and the shore.'

In 1903, this permit was again modified so as to allow the company 'to build farther out into the rapids of St. Marys River,' to remove the power house and a portion of the embankment dam now in use, and to construct a larger power house and longer wall to inclose a forebay and to construct a wider tail-race. Work under this last permit was commenced in the spring of 1905 and is now in progress.

The available head of water on the present works is about 9 feet. The power developed by the turbines is about 750 h.p. The amount of water used in this develop-

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ment is about 1,400 cubic feet per second, including leakage. The natural fall in the rapids in front of the shore holdings of the Company was found to be about nine feet, when it was measured in the fall of 1903.

The building, in 1892, of the dyke above mentioned, under permit of that year, obstructed the flow through the rapids under two spans of the International Bridge, shutting off a water area about 1,915 square feet in cross section.

Work is now progressing under the permits granted by the War Department of the United States, and it is expected that a head of about 13 feet will be obtained, furnishing 4,700 mechanical horse-power by the consumption of 4,000 second feet.

The interests constructing these works claim the rights to do so, not only under the permits granted, but, so far as the occupation of the bed of the rapids opposite the Chandler lands is concerned, by virtue of asserted riparian rights appurtenant to the ownership of the adjacent shore. In a litigation now pending, brought by the United States against the Chandler-Dunbar Water Power Company in the Western District of Michigan, the District Court has decided that the ownership of the shore lands carries with it the title to the bed of the river, including Islands Nos. 1 and 2, and from this it follows that the right to erect structures in the river to utilize the waters of the river for power purposes as it flows, past the riparian owners land, exists, subject merely to the restriction that the structures must not, directly or indirectly, injuriously affect navigation.

The Lake Superior Corporation, through its subordinate companies, the Lake Superior Power Company, organized under the laws of the province of Ontario, and the Michigan-Lake Superior Power Company, organized under the laws of the State of Michigan, has constructed canals on both sides of the river, with works for the development of power.

On June 30, 1888, 'The Sault Ste. Marie Water, Gas and Light Company,' was incorporated on the Canadian side under the Revised Statutes of Ontario, Chapter 164. By Act of 1889 the name of the Company was changed to 'The Ontario Water, Light and Power Company,' and it was given power to build dams across the inland channels or rapids of St. Marys River or any branch thereof within the province of Ontario and to construct such other works as might be necessary to supply them with the water needed for their operations, such rights to be exercised only with the consent of the Crown or the individual affected.

After partially completing a water power canal, this company became financially embarrassed and was not able to continue the undertaking.

In 1895, Francis H. Clergue and his associates took over the property of the old company, including franchises for supplying the town with electric lighting, water and street railway privileges. At the same time the name of the company was changed to 'the Lake Superior Power Company,' and in 1896 a portion of St. Marys Island opposite the rapids was granted to the company in exchange for certain lands in the town of Sault Ste. Marie, Ont. The Lake Superior Power Company also acquired other lands in the vicinity north of the Canadian Ship Canal, and at once began the development of water power. 'The Consolidated Lake Superior Company' was formed in 1901 to consolidate and control the interests of this company, the Michigan Lake Superior Power Company, and many others, and in 1904, it was reorganized under the name of 'The Lake Superior Corporation.'

The canal of the Lake Superior Power Company is about 220 feet wide at the water line and $12\frac{1}{2}$ feet deep at the head gates, changing gradually to a prism 86 feet wide and $15\frac{1}{2}$ feet deep at the power house. The present plant is developing about 11,000 h.p. at the turbine shafts. The average amount of water used has been estimated at about 7,000 cubic feet per second, with a maximum of 8,800 cubic feet per second when all wheels are running at full capacity.

In building its works, this company occupied the bed of a small stream, running between the islands on the north side of the river, having a water cross section estimated at 1,603 square feet. This company, with the allied company, the Michigan Lake Superior Power Company, to be described below, has also erected remedial works

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on the Canadian side of the river above the 9th and 10th spans of the International Bridge, being the two spans nearest to the Canadian shore, making it possible to nearly stop the flow of water under those spans. The same company has projected a second canal of much larger capacity, work upon which has not been begun.

About 1887, the St. Marys Falls Water Power Company began excavation for a canal through the town of Sault Ste. Marie, Michigan, from a point above the ship canal to connect with the river below the locks. This company failed, and its right of way was purchased by the Michigan Lake Superior Power Company, incorporated under the laws of Michigan, one of the allied companies subsequently forming the Consolidated Lake Superior Company.

The Michigan Lake Superior Power Company has constructed a canal over two miles in length with a cross sectional area of about 4,300 square feet, extending from above the upper end of the St. Marys Falls Ship Canal to a point about a mile below the locks, where it debouches into the lower river.

Pursuant to the provisions of the River and Harbour Act, approved June 13, 1902, the Secretary of War of the United States, under date of December 12, 1902, granted the Michigan Lake Superior Power Company a permit for the diversion of the waters of the St. Marys River through its canal subject to prescribed regulations based upon the maintenance of proper water levels, including the erection of remedial works. The remedial works have been partially constructed, but owing to the fact that they have not been completed, and to the fact that repairs to the company's power house and forebay are needed the full capacity of the canal, 31,200 second-feet, is not used, 8,500 second-feet being the estimated amount actually utilized at present. The remedial works, so far as completed, are those above mentioned partially covering the spans nine and ten of the International Bridge on the Canadian side.

HYDRAULIC CONDITIONS.

The head of the canal at St. Marys Rapids is situated about 14 miles below Point Iroquois, which may be considered the head of St. Marys River. In this 14 miles there is a fall of only about 0.4 foot. As this slope is so slight it is practically constant for all stages of water level, and the mean level of Lake Superior is directly affected by any changes in level that may occur in St. Mary's River above the rapids. The lowest monthly mean level of St. Marys River above the locks within the past 33 years, was in March, 1879, the level being 600.38 feet above mean tide at New York. Since that year it has never been below 601.0 feet during the months of the navigation season, May to November. Since 1893 there has been but one month during the navigation season when the mean level fell below 601.7 feet. Since 1876 the mean level has never been above 603.2 feet.

Previous to the building of the International Bridge in 1887, the channel of St. Marys River at the rapids consisted of the main channel and four small streams running between the islands near the Canadian side. At a water level of 601.7 feet the cross sectional area of these streams previous to obstruction is estimated to have been about 13,452 square feet for the main channel, and 2,064 square feet for the small streams, giving a total area of section of 15,516 square feet. This cross section has been obstructed from time to time by the following works:—

In 1887 the International Bridge was built across the rapids near the head. The piers placed in the rapids cut off an area of section of about 1,133 square feet. During the building of the bridge, and subsequently, fills have been made near the ends of the bridge causing a further obstruction estimated at about 1,139 square feet, including three of the small streams above mentioned and making a total estimated area of section obstructed by the bridge of about 2,272 square feet.

The building, in 1889, of the canal subsequently purchased by the Lake Superior Power Company on the Canadian side, obstructed the fourth of the small streams mentioned above, estimated to have had an area of 1,603 square feet. Subsequently, this company, in connection with the Michigan Lake Superior Power Company, con-

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structed remedial works across spans 9 and 10 of the bridge, span 10 being completely closed and span 9 being closed by stoney gates, which may be opened if necessary. The cross sectional area of span 10 so obstructed was about 724 square feet, and of span 9, 1,649 square feet, giving a total cross section of obstruction of 2,373 square feet for remedial works, or 3,976 square feet, if we include the small stream mentioned above.

The dyke built by the Chandler-Dunbar Water Power Company in 1892 closed the area under the first two spans of the bridge with a total water cross section of about 1,915 square feet.

The total area thus obstructed by all works amounts to 8,163 square feet, or more than one-half of the original cross section. The total area of cross section obstructed previous to the construction of the remedial works was 5,790 square feet.

The first effect of these various obstructions was to reduce the discharge of the river, although the flow through the channels not obstructed was somewhat increased. If no diversion were made, the discharge over the rapids being diminished, the mean water level would eventually rise to such a height as to give a discharge through the restricted cross section equal to that which would have taken place through the original cross section at the lower level. The elevation of the water surface would then fluctuate about this new higher mean level much the same as it did before about the lower mean level. The decrease in discharge, due to the obstructions mentioned above other than the remedial works, may be roughly estimated as follows for stage 601·7 feet:—

Flow intercepted by—	
International Bridge piers and fills	7,000 sec. ft.
Chandler-Dunbar Company	7,500 “
Works of Lake Superior Power Company	4,500 “
Total	19,000 “

Since to determine the discharge of the river by observations from the International Bridge, the section upon which most of the observations for discharge have been made, involves estimating the amount of water used by the locks and the several power companies in order to arrive at the total discharge, the results of the discharge measurements are not always accordant. These observations for discharge have not extended over as wide a range of level as could be desired to give a good determination of the rate of change in discharge for change in stage. From a consideration of the published results, however, it appears that previous to the placing of the remedial works at spans 9 and 10 of the bridge, that portion of the discharge of the river passing the rapids alone was 66,500 second feet at elevation 601·7 feet, and 80,400 second feet at elevation 602·7 feet. If these discharges are correct, a rise in the water surface of one foot corresponds to an increase in discharge of 13,900 second feet and the effect of placing obstructions cutting off 19,000 second feet would therefore be to eventually raise the mean lake level approximately 1·4 feet.

Only a portion, perhaps not more than half, of this obstruction, has actually been effective for the reason that it takes place slowly, and that the obstruction has not been complete since the channels have been replaced by the power canals through which the water is allowed to pass.

As the result of observations of discharge made in 1899 and 1902 by the officers of the United States Lake Survey, equations were determined representing the flow in the rapids, first, in spans 3 to 10, inclusive, or previous to the construction of the remedial works above spans 9 and 10 on the Canadian side of the river, and second, in spans 3 to 8, inclusive, or after the remedial works were in place. From these equations it appears that previous to the placing of these remedial works the discharge at 601·7 feet was 66,485 cubic feet per second and that with the remedial works in place the discharge at this stage is 56,880 cubic feet per second, giving a diminished discharge due to the placing of the remedial works of 9,605 cubic feet per second at this stage.

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The total flow stopped by the obstructions placed by the various companies may then be summarized as follows for stage 601.7 feet:—

Bridge	7,000 sec. ft.
Chandler-Dunbar Water Power Company	7,500 “
Lake Superior and Michigan Lake Superior Power Company	14,100 “
Total	28,600 “

The present uses of water are estimated to be as follows:—

Government Canals	600 sec. ft.
Chandler-Dunbar Water Power Company	1,400 “
Lake Superior and Michigan Lake Superior Power Company	15,500 “
Total	17,500 “

Previous to the placing of the remedial works of the Lake Superior Power Companies, above spans 9 and 10 of the International Bridge, the discharge of the river at elevation 601.2 was probably about 61,000 second feet. Although the discharge may have fallen below this figure for a few months in years of low water it may be taken as the ordinary low water discharge. Of this amount not less than 4,000 second feet should be reserved for the use of locks and the passage of logs. The Michigan Lake Superior Power Company has a canal designed to take a maximum of 31,200 second feet, the Chandler-Dunbar Water Power Company has works under construction designed to use 4,000 second feet, and contemplates still further development. The Lake Superior Power Company's present works are sufficient to use at least 9,000 second feet, and further development is contemplated, presumably to the extent of using one-half the surplus waters of the river.

It is apparent, therefore, that the actual present use of water for power purposes is nearly equal to the amount of flow obstructed by the works of all the power development companies considered as a unit, and it is clear that the amount of water required for the proposed additions to present power developments is so great as to call for complete control of such extensions by an international commission.

At present the duty of maintaining the water level above the rapids rests upon the Michigan Lake Superior Power Company; the Act of Congress, approved June 13, 1902, authorizing this company to divert water from St. Marys River with the consent of the Secretary of War and the Chief of Engineers, specifically provides that the level of Lake Superior shall be maintained at the expense, if need be, of the works of this company. With the knowledge that plans for enlarging the works of the power companies were projected, Congress, in the same Act provided for an investigation of the conditions with a view to an agreement looking to international control and regulation. The Commission has used the Rules and Regulations under which the Michigan Lake Superior Power Company was permitted by the Secretary of War of the United States to divert the waters of the St. Marys River, as a basis for the new Rules recommended, adapting them to the wider application now necessary.

RECOMMENDATIONS.

The Commission would respectfully recommend:—

1. That no permits shall be granted for the use of the waters of the St. Marys River, or for the erection of structures in, under or over, or the occupation in any manner of, the said waters until plans have been submitted to the Commission for its investigation and recommendation; and the use of the waters under such permits shall not be allowed except upon compliance with the rules hereinafter recommended.

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2. The Commission further recommends that no grants, permits or concessions should be made, which directly or by operation of law may, in any manner, affect the right of the United States or of Canada to control the bed of the St. Marys River, below high water mark, and especially that none should be made which, legally or equitably, may be the means of adding to the expense of acquiring lands or rights for the purpose of making improvements in aid of navigation, or which may give an equitable right to compensation in case of the removal of structures in said river.

3. That steps be taken to increase the lockage facilities at the Sault Ste. Marie without unnecessary delay.

4. That the Governments of the United States and Canada reserve all water necessary for navigation purposes, at present or in the future, and the surplus shall be divided equally between the two countries for power purposes.

5. As the Commission regards the interests of the United States and Canada in the preservation of the lake levels, and in the improvement of the channels and the conservation of the water supply for purposes of navigation, as identical and as incapable of efficient protection without joint and harmonious action on the part of the two Governments, it recommends that the rules hereinafter set forth be adopted, and that a joint commission be created to supervise their enforcement, or that such powers be vested in the existing International Waterways Commission, subject to such restrictions and reservations as may be deemed advisable.

The Commission has adopted unanimously the following resolution:—

Resolved, That this Commission recommends to the Secretary of War of the United States and the Minister of Public Works of Canada, the following Rules to govern the use of water at the Sault Ste. Marie:—

1. No person shall place any structure in, over or under the St. Marys River, nor shall any person place any obstruction in said river, or make any excavation in the bed thereof, or divert water therefrom, until plans for the work shall have been submitted to an international waterways commission, nor until consent shall have been given by the Secretary of War of the United States and the Minister of Public Works of Canada. All work must be done in accordance with plans approved by such Commission and subject to its supervision and inspection; and no water shall be used or diverted until the completed work shall have been approved by the Commission.

2. Persons now using or diverting the waters of St. Marys River for power purposes shall forthwith submit complete plans of all their works existing and proposed, and until such plans have been approved by the Commission, they shall not use or divert the waters of said river in excess of the amount now actually used or diverted by them.

3. Plans for work contemplating the use or diversion of water, must include such remedial and controlling works as may be necessary to maintain levels. Such works must provide for: (1) compensation equal to the amount of water to be used or diverted, (2) complete stoppage of flow through canals and works, (3) passage of the amount of water naturally flowing through the section occupied by the remedial works, (4) passage of logs over the rapids.

4. The level of St. Marys River above the rapids, shall be maintained between the elevations 601·7 and 603·2 feet above mean tide at New York according to the system of levels established by the United States Government in 1903, and defined by a bench mark on the coping of the Weitzel lock at Sault Ste. Marie, Michigan, the elevation of which is 606·069. The approval of plans of works by the Commission and the consent of the Secretary of War and Minister of Public Works to construct works or to use or divert water shall in no way relieve the owners and persons operating such works from the duty of maintaining said level.

5. Nothing herein contained shall be held to affect any existing riparian or other rights, or the existing remedies therefor, or any action at law or in equity now pending. All remedies herein provided shall be cumulative, and shall be without prejudice to any other remedies for failure of persons operating under permits to maintain the

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levels for navigation purposes. Nothing herein contained shall be held to affect the exercise of the right of any executive officer of either the United States or Canada, acting under the laws of his respective country, to prevent the placing or to cause the removal of any obstructions in St. Marys River, or to otherwise preserve or restore the navigability of any part thereof.

6. Persons using or diverting the waters of St. Marys River shall operate under the following regulations:—

(a) The General Superintendent of the St. Marys Fall Canal, under the orders of the Engineer Officer in charge on the American side, and a resident officer appointed by the Canadian Government on the Canadian side, shall form a Board whose duty it shall be to see that these regulations, and any others that may hereafter be made by proper authority, are duly obeyed. The officers of this Board and their deputies shall have access to all the power works at any time, and all said power works, which term includes canals, escape valves at the power houses, head gates and remedial works, shall be operated in accordance with the orders of said Board, and said Board shall have power to assume entire control of said works, or any of them, whenever it considers such action necessary in the interests of navigation.

(b) Should the monthly mean level fall below 601.7 feet for any calendar month, the flow through the power works shall be reduced to such an extent as to restore the monthly mean level to 601.7 feet. Should the monthly mean level remain below 601.7 feet for six consecutive months, all flow through the power works shall be stopped until the monthly mean level shall again be above 601.7 feet. Should the monthly mean level fall below 601.2 feet all flow shall likewise be stopped until the monthly mean level shall again be above 601.2 feet.

(c) Should the monthly mean level rise above 603.2 feet the flow through the power canals and remedial works shall be increased to their maximum capacity, and shall so continue until the monthly mean level shall be less than 603.2 feet.

(d) Should the power canals, remedial or controlling works be found not to be of the capacity to produce the regulation required, the persons using the water shall alter their works at their own expense as soon as possible, so as to allow more flow, in a manner approved by an international commission.

(e) Should currents detrimental to navigation be developed by the operation of any power works, the persons operating such works shall alter them or construct such other works as an international commission may consider necessary to remedy the evil, all in a manner to be approved by said commission.

(f) The Board mentioned in regulation (a) shall have power to determine whether the conditions mentioned in any of these regulations have arisen to call for the application of said regulations and its determination shall be final; and said Board shall have power to apply to any works such special regulations as they may deem necessary in the interests of navigation.

(g) If remedial works be used for the passage of logs or rafts, the gates must be operated at the expense of the persons owning or operating the works whenever needed.

7. Wherever powers of officers are mentioned in these rules, it is understood that the Governments of the United States and Canada reserve the right to vest such powers in, and confer others upon, other officers or the international commission.

8. It is further understood that the Governments of the United States and Canada reserve the right to amend, add to or abolish these rules or any of them by joint action, and that they may vest the power so to do in the international commission.

9. In the event of any person subject to these regulations refusing or neglecting to obey, abide by, or conform to any ruling direction or order of the Commission or of the Board mentioned in Regulation (a), such Commission or Board may, through their officers, servants, or agents, at once shut off the supply of water to such person or take such steps to compel compliance with such ruling, direction or order as the Commission or said Board may deem proper.

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10. Persons owning or operating power canals or works shall not be entitled to damage or compensation from the Governments of the United States or Canada in any case whatsoever, for any act or acts done by them or either of them, or by their officers or agents at any time, in executing or enforcing these rules, or in exercising the right to control or suspend the flow of water through canals or remedial works or both or in revoking or annulling any permits or grants which may have been or shall hereafter be issued or made to such persons.

11. For the purpose of construing these rules the word 'person' or 'persons' shall be taken as including natural persons, corporations, associations and partnerships whenever they are used, but shall not include the Government of the United States or that of Canada.

GEORGE C. GIBBONS,
Chairman, Canadian Section.

O. H. ERNST,
Colonel, Corps of Engineers, U.S.,
Chairman, American Section.

W. F. KING,
Commissioner.

GEORGE CLINTON,
Commissioner.

LOUIS COSTE,
Commissioner.

GEORGE Y. WISNER,
Commissioner.

THOMAS COTE,
Secretary, Canadian Section.

L. C. SABIN,
Secretary, American Section.